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Keeton

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[54] **PROCESS AND APPARATUS FOR STITCHING EXCESS THREAD CHAIN ON A SEWING MACHINE**

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[51] **Int. Cl.**[4] **D05B 65/06**

[52] **U.S. Cl.** **112/262.1;** 112/130; 112/276; 112/288

[58] **Field of Search** 226/153; 112/318, 288, 112/130, 291–298, 262.1, 271, 276, 277; 271/119

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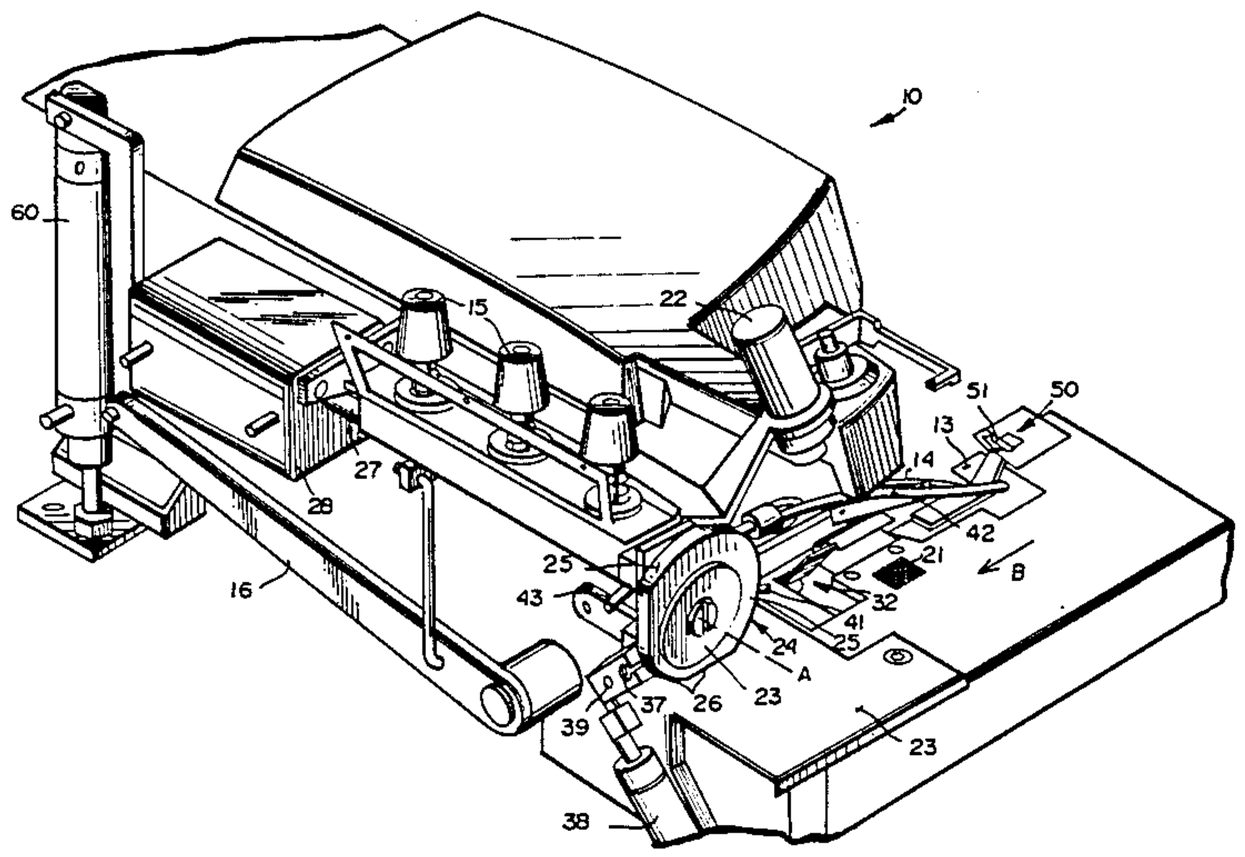
[57] **ABSTRACT**

An attachment for a semi-automatic sewing machine ensures that any excess thread chain extending from the leading or trailing edge of a garment during an operation on the garment with the sewing machine, is stitched directly to the garment so that no loose or free ends of thread chain are provided. The completion of stitching by the sewing machine of a first garment is sensed with an electric eye, and the first garment is engaged in response to the sensing by a rubber wheel which moves the garment away from the stitching needle more quickly than the sewing machine stitches the stitch chain. The excess thread chain is automatically severed by a movable plate rotating with respect to a stationary plate, and the excess severed thread chain is automatically positioned (by a blower, a catcher and a block of rubber) so that excess thread chain is stitched to the second garment by the sewing machine. Stitching action of the sewing machine is automatically stopped by a drop-off linkage arrangement which includes a linear actuator and rod connected to the foot pedal for the sewing machine, and an arm for actuating the sewing machine clutch.

19 Claims, 7 Drawing Figures



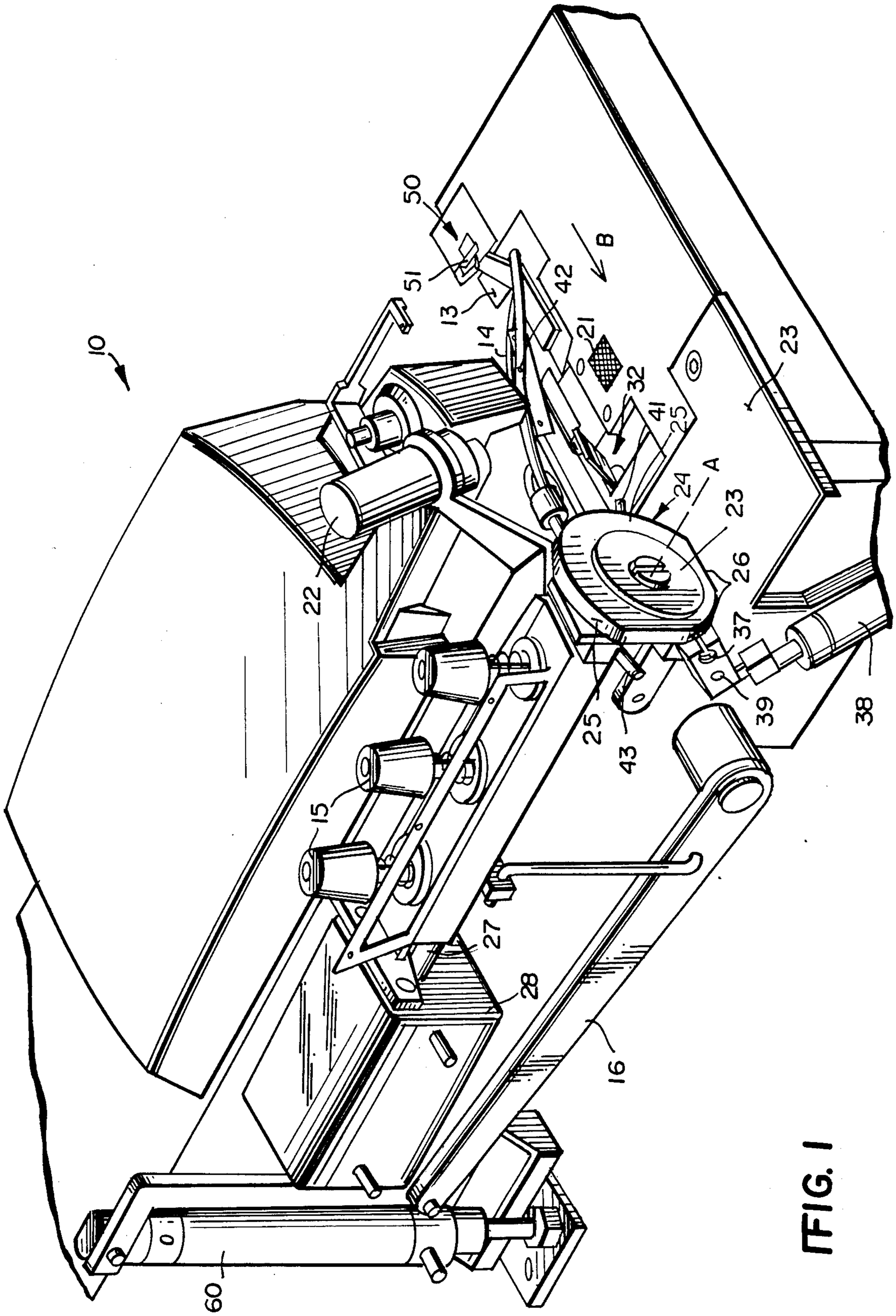
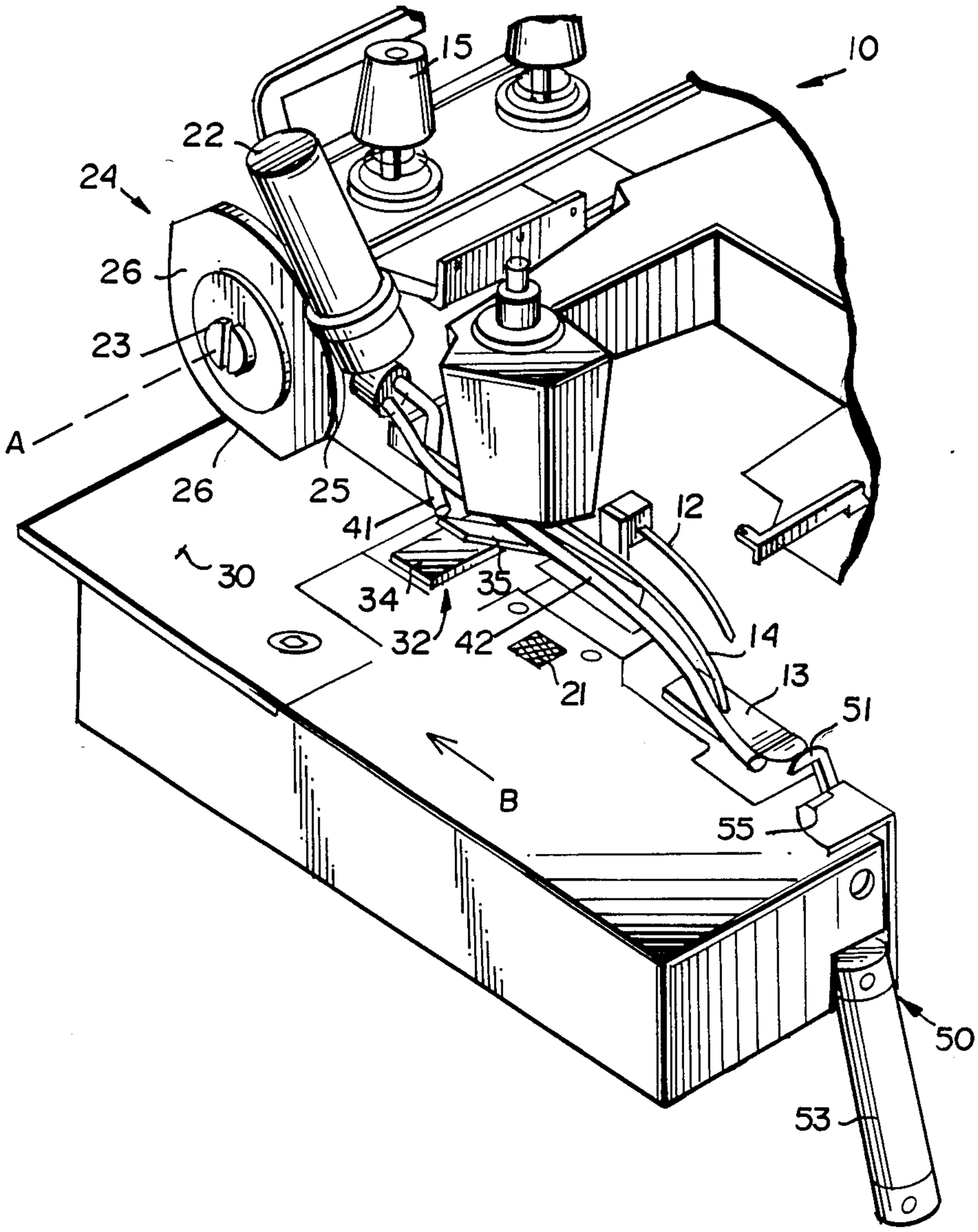


FIG. 1

FIG. 2



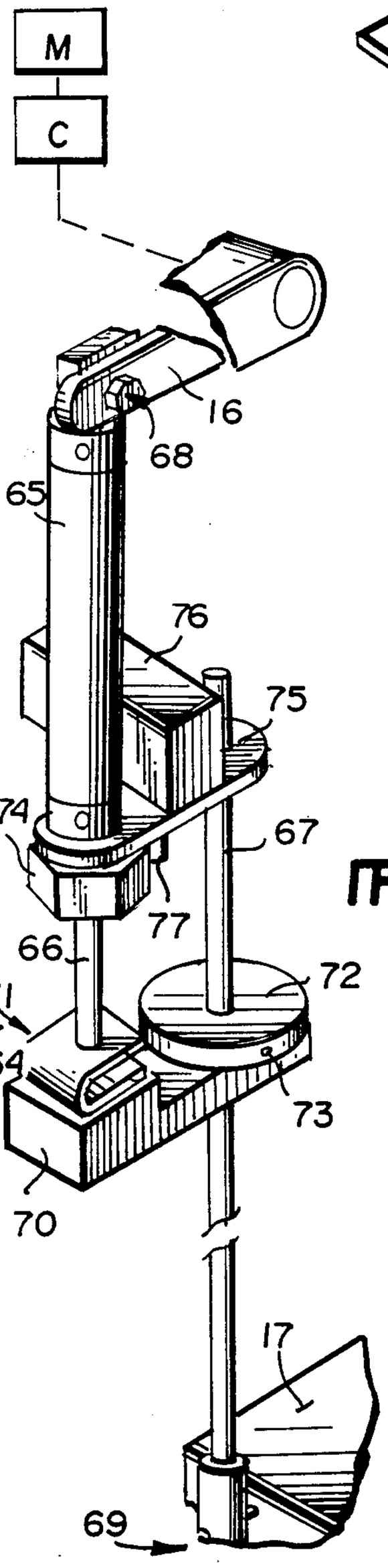


FIG. 3

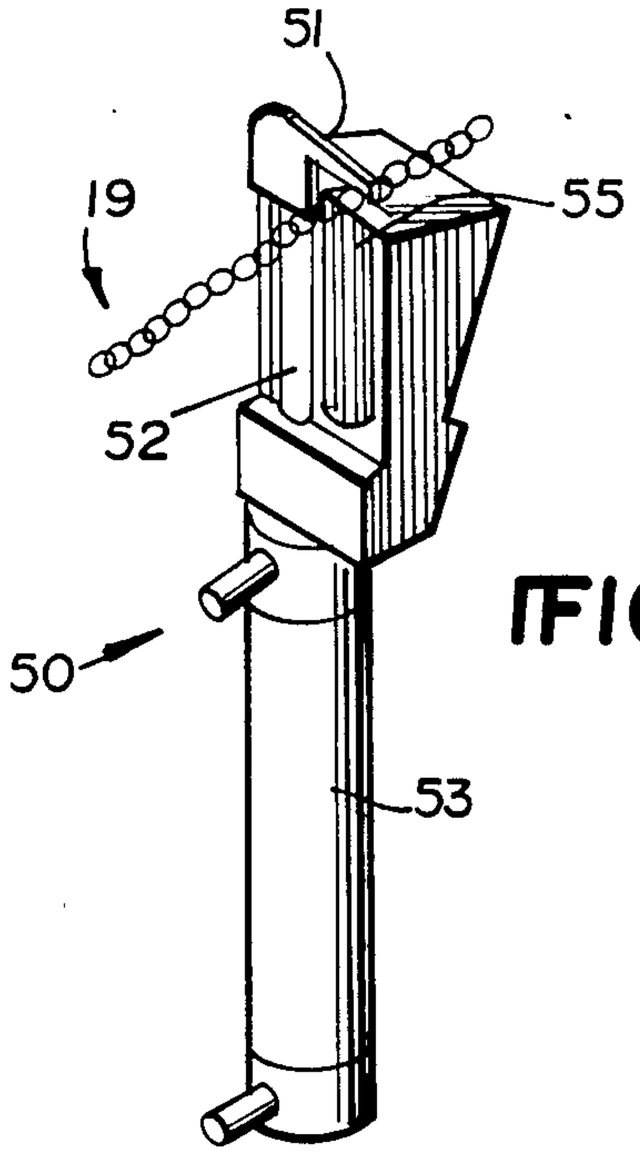


FIG. 5

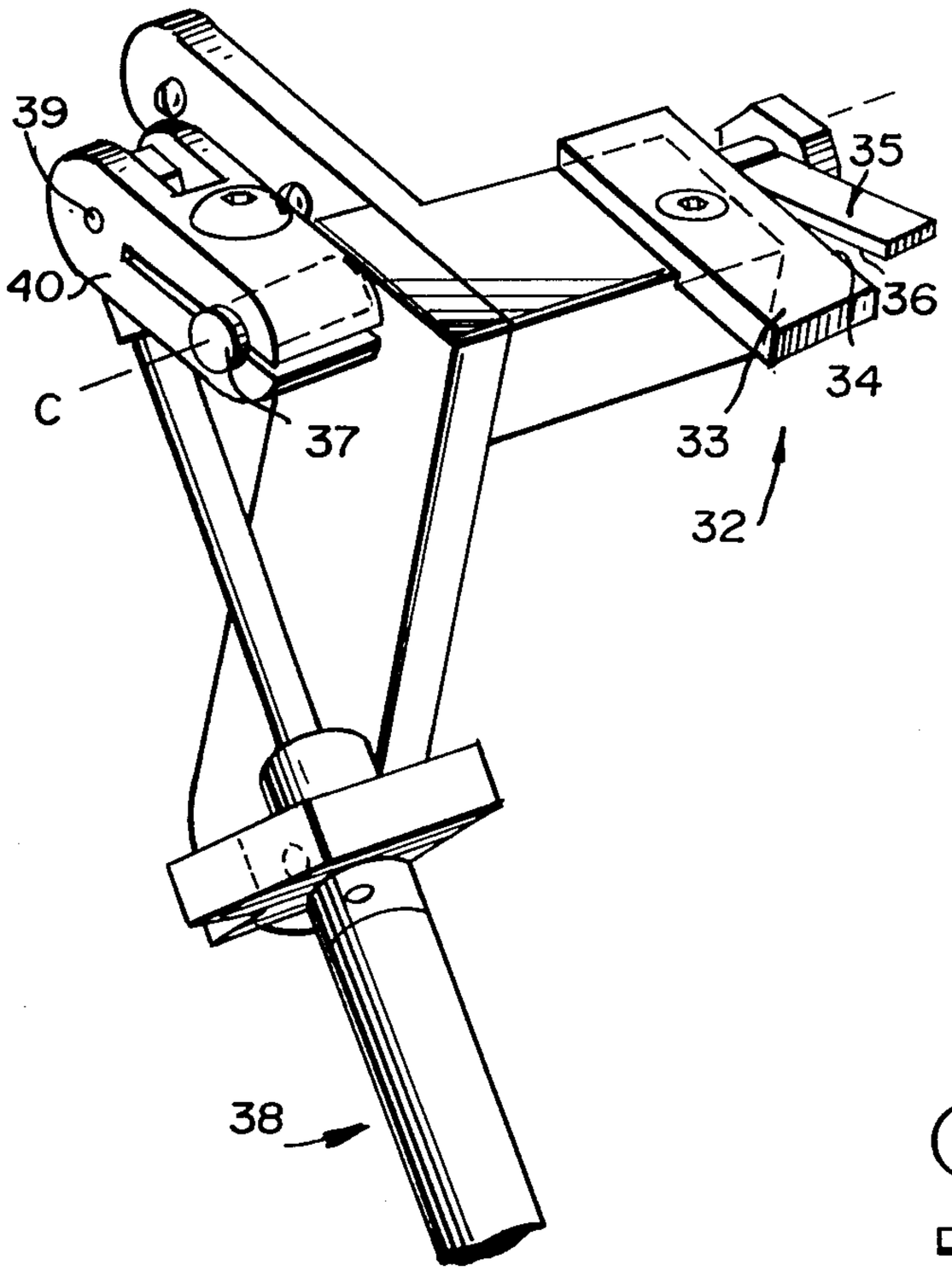


FIG. 4

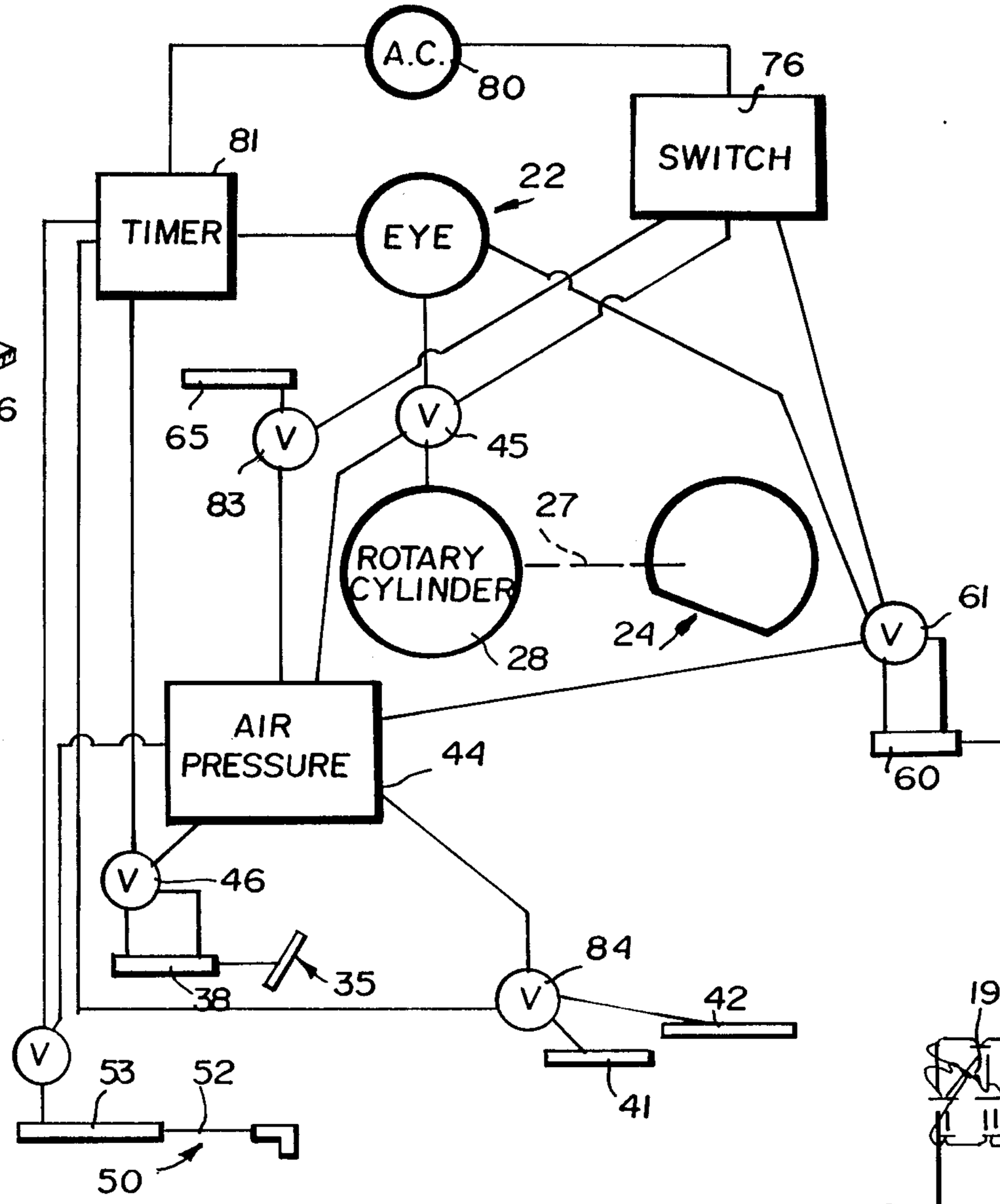
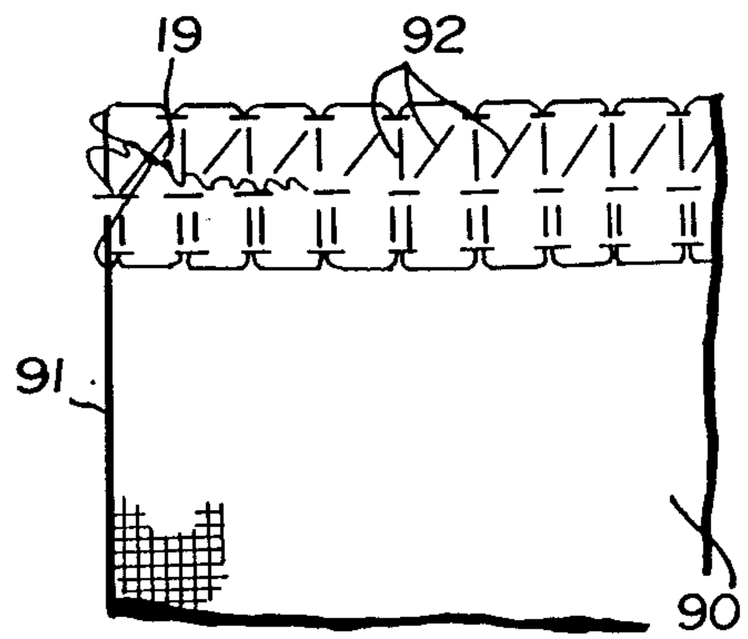


FIG. 6

FIG. 7



PROCESS AND APPARATUS FOR STITCHING EXCESS THREAD CHAIN ON A SEWING MACHINE

BACKGROUND AND SUMMARY OF THE INVENTION

When sewing garments, or other articles, with semi-automatic sewing machines, when the sewing of one garment has been completed and an operator lets up on the foot pedal for controlling the sewing machine, it takes a significant period of time before the automatic sewing machine stops stitching the thread chain. During the time that the needle of the sewing machine is still moving, but stitching of the garment has been completed, a thread chain about 1–1½ inches in length may be formed. While conventionally the thread chain can be severed so that not too long a portion thereof extends from the rear of the garment, when sewing is restarted on a second garment the thread chain often extends from the front of the second garment and spoils the appearance of the garment. Therefore, in the conventional commercial practice, the thread chain must be cut off manually, resulting in labor costs that are higher than desirable, and disrupting the ability to automate the garment handling operations.

It has been recognized in the art that it is desirable to fold back the chain stitching so that it will be stitched onto the trailing garment, as exemplified by U.S. Pat. No. 4,038,933. However heretofore there have been a number of practical difficulties associated with producing commercial machines to successfully perform that function, and at the present time there are no known commercial machines in widespread use which do perform the folding-back and stitching function.

According to the present invention an attachment for an automatic sewing machine, and a method of automatically stitching excess thread chain, are provided which result in practical and effective stitching of excess thread chain to a subsequent garment. The attachment and the method according to the present invention are completely automatic so that no operator intervention is necessary; in fact the operator need not even let up on the foot pedal for controlling the semi-automatic sewing machine once the stitching has been completed.

According to one aspect of the present invention, an attachment is provided for a semi-automatic sewing machine having a stitching needle for stitching a thread chain, a presser foot, and a power source. The attachment comprises the following components: A means for sensing the completion of stitching, by the sewing machine, of a first garment, by sensing a trailing portion of the first garment. A means for automatically engaging the first garment in response to the sensing and moving the first garment from the stitching needle more quickly than the sewing machine stitches the thread chain, to pull excess thread chain extending past the trailing portion of the first garment relatively taut. A means for automatically severing the excess thread chain from the trailing portion of the first garment when the excess thread chain is relatively taut; and a means for automatically positioning the excess thread chain with respect to a second garment so that the excess thread chain is stitched to the second garment by the sewing machine.

The automatic sensing preferably is provided by utilizing an electric eye including a target mounted on the base plate of the sewing machine, and the light emitting and sensing mechanism mounted above the target.

The means for automatically engaging the first garment preferably comprises a wheel having the garment engaging portions thereof of rubber, or another elastic material. The wheel is rotated about an axis perpendicular to the direction of the garment movement, and cooperates with the flat surface of the sewing machine to propel the garment away from the needle when an arcuate circumferential portion of the wheel (about 270° of its circumference) is above the surface. Once cut-out (scalloped) portions of the wheel periphery are above the surface, however, the wheel no longer engages the garment even though it continues rotation. At that point the excess thread chain is taut.

The automatic severing means preferably comprises a stationary plate having an edge, the plate disposed between the stitching needle and the wheel. A rotatable plate having an edge cooperating with the edge of the stationary plate is rotated by a shaft to effect severing. A linear actuator is connected to the shaft to effect the rotation.

The means for automatically positioning the excess thread chain comprises a pair of air jets which are blowing means for blowing the threaded chain from its severing position to a position on the opposite side of the stitching needle. A catcher, comprising a catching finger actuated by a linear actuator, and cooperating with a block of rubber, grabs the excess thread chain and holds it in place, while gradually releasing it as it is being stitched into the next garment by the sewing machine.

Means are provided for automatically stopping the stitching action of the sewing machine and raising the presser foot in response to sensing of the trailing portion of the first garment. This means comprises a linear actuator operatively connected between an arm for engaging and disengaging the clutch of the sewing machine, and the foot pedal for operating the sewing machine, and a rod having an enlarged actuator thereon. The linear actuator includes a movable portion thereof which has an abutment for engaging the enlarged portion of the rod, and means for effecting actuation of the linear actuator to move the abutment—in response to the sensing—away from the enlarged attachment to the rod so that the rod does not engage the abutment, thereby causing the arm to move to a clutch disengaging position. A resetting switch is provided on the abutment which is engaged by the rod enlarged portion to reset the components so that the operator, by manipulation of the foot pedal can start the next stitching cycle.

The invention also comprises the individual components of the attachment as described above, which may cooperate with other types of components for performing the same function as the preferred components according to the invention, to produce the desired result.

The invention also relates to a method of automatically stitching excess thread chain to a cloth so that no free stitches are provided on the leading edge of the cloth. The method comprises the steps of: (a) Automatically sensing the completion of stitching, by the sewing machine, of a first cloth, by sensing a trailing portion of the first cloth. (b) Automatically engaging the first cloth in response to the sensing and moving the first cloth away from the stitching needle more quickly than the sewing machine stitches the thread chain, to pull excess thread chain extending past the trailing portion of the first cloth relatively taut. (c) Automatically sev-

ering the excess thread chain from the trailing portion of the first garment when the excess thread chain is relatively taut. And (d) automatically positioning the excess thread chain with respect to a second cloth so that the excess thread chain is stitched to the second cloth by the sewing machine, so neither cloth has free stitches extending therefrom.

It is the primary object of the present invention to provide a simple, effective, and practical method and attachment (including components thereof) for automatically stitching excess thread chain to a trailing cloth in the operation of a semiautomatic sewing machine. This and other objects of the invention will become clear from an inspection of the detailed description of the invention, and from the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a top, rear, perspective view of exemplary apparatus according to the invention shown in conjunction with a conventional semi-automatic sewing machine;

FIG. **2** is a top, front, perspective, detail view of major operative components of the attachment according to the invention;

FIG. **3** is a perspective view of a linkage drop-off mechanism according to the present invention for automatically terminating (and subsequently resetting) operation of the sewing machine;

FIG. **4** is a detail perspective view of an exemplary severing attachment according to the present invention, including the actuator therefor;

FIG. **5** is a detail perspective view of exemplary catching means according to the present invention, shown in cooperation with a thread chain;

FIG. **6** is an exemplary control schematic illustrating an exemplary interconnection between component parts according to the invention; and

FIG. **7** is a top plan view showing the stitching of the excess thread chain to a garment, according to the method of the invention.

DETAILED DESCRIPTION OF THE DRAWINGS

A conventional over-edger type semi-automatic sewing machine is illustrated generally by reference numeral **10** in FIGS. **1** and **2**. This machine conventionally has a tongue about $\frac{3}{8}''$ long, and a throat plate, on the frame of the machine below a presser foot **13** mounted on linkage **14**, a stitching needle **12** (see FIG. **2**), thread spools **15**, and like components. A power source such as an electric motor M, conventionally powers the machine **12**. The electric motor is connected through a conventional clutch C to an actuating arm **16** (see FIG. **3**), which is controlled by a foot pedal **17**.

In conventional commercial practice, after one garment is stitched by a conventional semi-automatic sewing machine, when stitching is completed the operator lets up on the foot pedal, which causes the clutch to be disengaged and the stitching action of the needle to stop. However there is an inherent time delay between the operator's activation of the foot pedal and the actual stopping of the stitching action, with the result that a stitch chain **19** (see FIGS. **5** and **7**) is produced. When the stitch chain is, conventionally, severed from the garment that has just been stitched, it normally be will provided as a free chain, or fibers, extending from the leading edge of the next garment to be stitched. This is unsightly, and not acceptable. Therefore the stitch chain either must be cut off manually, or, more desirably, stitched into the seam of the next garment.

According to the present invention, an attachment for the semi-automatic sewing machine **10** for performing the above-desired operation, is provided. A first significant component of the entire attachment comprises means for sensing the completion of stitching by the sewing machine of a first garment by sensing a trailing portion of the first garment. The automatic sensing means preferably comprises electric eye means, such as the eye target **21** (see FIGS. **1** and **2**) mounted just downstream of the presser foot **13**, and the light emitting and sensing electric eye apparatus **22** mounted above, and in operative association with, the eye target **21**.

A second significant component of the entire attachment according to the invention comprises means for automatically engaging a first garment in response to the sensing means **21**, **22** and moving the first garment away from the stitching needle **12** more quickly than the sewing machine stitches the thread chain, to pull excess thread chain extending past the trailing portion of the first garment out of engagement with the tongue, and relatively taut. The automatic engaging means according to the invention preferably comprises the wheel **24**. The wheel **24** preferably is of rubber or other elastic material, or at least the garment engaging portions thereof are of rubber or the like. In particular, the wheel **24** includes a generally circular arcuate circumferential portion **25**, the arcuate extent of the portion **25** preferably being about 270°, as illustrated in FIGS. **1** and **2**. A hub **23** mounts the wheel **24** on a shaft **27** which is powered by a rotary pneumatic cylinder **28**, or a like power source for rotating the shaft. The axis A defined by the shaft **27**, and about which the wheel **24** rotates, is generally perpendicular to the direction of movement B of the garments through the sewing machine **10**.

The wheel **24** also has surface means, preferably cutouts or scalloped portions, **26** extending over approximately 90° of the circumference of the wheel. During operation of the wheel **24**, which is spaced above the flat surface **30** of the sewing machine **10**, when the circumferential portion **25** is above the surface **30**, the garment between the portion **25** and surface **30** is engaged by the wheel **24** and propelled in the direction B at the tangential velocity of the portion **25**. The portion **25** is dimensioned so that its circumferential extent corresponds generally to the linear extent of a garment portion beneath it so that the stitching chain **19** will be held taut once the portion **25** is at the end of its rotation. The cylinder **28** rotates the shaft **27** approximately 360°, however, and the surface means **26** are provided so that when they are above the surface **30** they do not engage the garment and no longer propel the garment. After completion of an operation cycle, the cylinder **28** rotates the wheel **24** back to its original position (FIGS. **1** and **2**).

Another significant component of the complete apparatus according to the invention comprises the automatic severing means illustrated generally by reference numeral **32** in FIGS. **1**, **2**, and **4**, and shown in detail in FIG. **4**. The severing means **32** automatically severs the excess thread chain **19** from the trailing portion of a first garment when the excess thread chain is relatively taut. The preferred severing means illustrated in the drawings comprises a stationary plate **33** flush with the surface **30**, having an edge **34**, and a rotatable plate **35** having an edge **36** which cooperates with the edge **34**.

The rotatable plate **35** is affixed to a shaft **37** and is rotatable therewith, the shaft **37** defining an axis D (see FIG. **4**) which is parallel to the direction B. A linear actuator, such as piston and cylinder assembly **38**, is pivoted at **39** to element **40** which is clamped onto the shaft **37**. A single stroke of the piston and cylinder assembly **38** thus rotates the rotatable plate **35** a predetermined amount, to effect severing of the thread chain.

Another significant component of the attachment according to the invention includes means for automatically positioning the excess thread chain **19** with respect to the second garment so that the excess thread chain is stitched into the seam of the second garment by the sewing machine **10**. Such positioning means preferably comprise first and second air jets **41, 42** which are connected up through conduit **43** (see FIG. **1**) to a source of air under pressure (**44** in FIG. **6**). This same source of air under pressure **44** may operate through valve **45** to actuate the rotary cylinder **28**, and may operate through valve **46** to actuate the linear actuator **38**.

The air jets **41, 42** are positioned so that the first air jet **41** will blow the thread chain **19**, immediately after severing, to the opposite side of the needle **12** from the position in which it is severed, while the second jet **42** specifically directs the thread chain to the catching means **50**.

The catching means **50** is seen most clearly in FIGS. **2** and **5** and preferably includes a catching finger **51** which is mounted on a piston rod **52** associated with the pneumatic cylinder **53**. The piston and cylinder assembly **52, 53** comprises a linear actuator for moving the catching finger from a holding position (not shown) to the catching position illustrated in FIGS. **2** and **5**. In the catching position illustrated in FIGS. **2** and **5**, the air jet **42** blows the thread chain **19** beneath finger **51**, and so that it is between the finger **51** and the block of material **55**. The finger **51** is in the catching position only instantaneously, and is moved back down into a position where it is retracted. In its retracted position, the catching finger **51** frictionally holds the chain **19** against the block **55** (which preferably is of rubber) so that when the next garment is being stitched, with the excess thread chain **19** being stitched into the seam thereof, the catching means **50** maintains tension on the thread chain **19** and only gradually releases it as the machine is ready to accept it, the thread chain **19** being pulled from between the finger **51** and the block **55**.

The cylinder **53** preferably is controlled through valve **57**, supplied by the fluid from air pressure source **44**.

It is also highly desirable, according to the invention, to provide for automatic stopping of the stitching action of the sewing machine, and for raising of the presser foot **13**, in response to the sensing of the traling portion of the first garment by the sensing means **21, 22**. This is preferably accomplished by actuation of the cylinder **60** (see FIGS. **1** and **6**) as controlled by the electric eye **22**, through valve **61** leading to air pressure source **44**.

Automatic stopping of the sewing machine is accomplished utilizing the linkage assembly **64** illustrated in FIG. **3**. The linkage assembly **64** comprises a linear actuator, such as the pneumatic cylinder **65** and piston **66**, which are operatively connected between the arm **16** and the foot pedal **17**, and a rod **67** likewise operatively connected between the arm **16** and the foot pedal **17**. For instance, one end of the cylinder **65** may be pivotally attached at **68** to the arm **16**, while one end of the rod **67** is pivotally connected at **69** to the foot pedal **17**.

Connected to the movable portion (piston rod) **66** of the linear actuator is an abutment **70**, a cushioning means, such as provided by a bent over strip of rubber **71**, preferably being provided between cylinder **65** and the abutment **70**. The rod **67** has an enlarged portion, in the form of disc **72** which is held thereon by a set screw **73**, which is adapted to cooperate with the abutment **70**. Also mounted to the cylinder **65**, as by the nut **74**, is the platform **75**, through which the rod **67** extends. Mounted on the platform **75** is the resetting means, such as switch **76** which is actuated by an actuator **77** adapted to engage the disc **72**.

FIG. **6** illustrates in schematic form various interconnections between the components. An A.C. source **80** supplies power to the electric eye **22**, the switch **76**, and the timer **81**. The supply of air to the pneumatic cylinder **65** is through the valve **83**. The supply of air to the air jets **41, 42** is through the valve **84**. All of the valves **45, 46, 57, 61, 83**, and **84** preferably are solenoid actuated.

Operation

A typical operation of the apparatus, in the practice of the method according to the invention, will now be described.

As a first garment moves in direction B in FIG. **1** a seam is stitched by the needle **12** of the semi-automatic sewing machine **10**, until the garment gets to the point where stitching is completed at which time the trailing edge thereof uncovers eye target **21**, which causes the electric eye **22** to be actuated. Actuation of the eye **22** causes immediate actuation of the valve **83** to supply fluid to the cylinder **65** so that the piston **66** moves downwardly in FIG. **3**, causing the abutment **70** to no longer engage the disc **72**. When this happens, despite the fact that the operator may still be pressing down on the foot pedal **17**, the linkage assembly **64** is "too long", and it no longer can retain the arm **16** in a downward position. Therefore the arm **16** moves upwardly to its normal, spring-biased position, deactivating the conventional automatic clutch for the sewing machine **10** and causing the stitching action of the sewing machine **10** to stop. In this way a minimum amount of excess thread chain **19** (e.g. about 1½ inches) is produced.

The electric eye **22** also automatic actuates the valve **45**, which supplies air to the rotary cylinder **28**. This causes the shaft **27** to rotate approximately 360°. During this rotation, the leading part of the circumferential portion **25** will come directly over the surface **30**, which will cause the first garment to be engaged and propelled in the direction B at a speed greater than the speed at which the needle **12** is produced stitch chain (the needle **12** still producing stitch chain because it is not possible to instanteously terminate that action), and will continue to be propelled in the direction B until the stitch chain is taut. As the stitch chain becomes taut, the circumferential portion **25** no longer is above the flat surface **30**, but rather the surface means **26** are, and therefore the garment is no longer propelled. During propelling action of the garment in direction B by the wheel **24**, the stitch chain is also pulled off of the thread tongue which is below the presser foot **13**.

The electric eye **22** also controls the valve **61** to supply fluid to the cylinder **60** which causes the linkage **14** to effect movement of the presser foot **13** away from the

surface **30**, allowing the action of the wheel **24** pulling on the garment to tighten the stitch chain **19**.

The electric eye **22** also controls the valves **46**, **57**, and **84** through a timer **81**. The timer **81** preferably introduces a time delay of approximately 0.2 seconds, which is enough time for the garment pulling and chain stitch tightening action to occur. After this time delay of approximately 0.2 seconds, the valve **46** is actuated so that air is supplied to cylinder **38**, causing rotation of shaft **37** and severing of the thread chain **19** by the edges **34**, **36** severing the thread chain. Simultaneously with that, the air jets **41**, **42** are temporarily actuated so that the jet **41** blows the thread chain **19** in a direction opposite to the direction B, toward the jet **42**, and the jet **42** blows the thread chain between the catching finger **51** and the block **55**. Note that actuation of valve **57** by the timer **81** has caused the cylinder **53** to move the piston rod **52** so that the finger **51** is in a position to accept the chain **19**. The valves **46**, **57**, **84** are actuated by the timer **81** for only a short period of time (e.g. for about 0.2 seconds after about a 0.2 second delay), just enough time for the thread chain **19** to be severed and to be caught between the finger **51** and the rubber block **55**. Then the termination of air delivery to the jets **41**, **42**, movement of the rotatable plate **35** back to its original position, and retraction of the piston **52**, are effected.

After the above described procedures, the operator resets the assembly merely by "heeling" the foot pedal which causes the disc **72** to move upwardly and engage the switch actuator **77** of the resetting switch **76**. This resetting action causes the valves **45**, **61** and **83** to be controlled so that the linkage **64** again "shortens up" so that the foot pedal **17** controls the operation of the automatic clutch through arm **16** (the piston rod **66** returning to its position of FIG. **3**), the presser foot **13** is moved downwardly to its position of FIGS. **1** and **2** by actuation of the cylinder **60**, and the rotary cylinder **28** is reversed to move the wheel **24** back to its original position.

When the operator then moves the second garment into operative association with the stitching needle **12**, the operator will push down on the foot pedal **17**, again causing the automatic clutch to the engaged and for the sewing machine **10** to form a seam in the second garment. Since the stitch chain **19** is held directly over the second garment, it is stitched into the seam of the second garment, the excess thread chain **19** being slowly pulled from between the finger **51** and the block **55** as the stiching action occurs. The leading edge of the second garment will then ultimately appear generally as illustrated in FIG. **7**, wherein the second garment **90** having a leading edge **91** thereof has stitching **92** formed by the sewing machine **10**, with the excess thread chain **19** stitched into the seam formed by the stitching **92**.

It will thus be seen that according to the present invention a practical and effective method and apparatus have been provided for folding-back and stitching into a trailing garment excess thread chain from the stitching of a previous garment. While the inventon has been herein shown and described in what is presently conceived to be the most practical and preferred embodiment thereof, it will be apparent to those of ordinary skill in the art that many modifications may be made thereof within the scope of the invention, which scope is to be accorded the broadest interpretation of the appended claims so as to encompass all equivalent attachments, structures, and procedures.

What is claimed is:

1. An attachment for a semi-automatic sewing machine, having a stitching needle for stitching a thread chain, a presser foot, and a power source, comprising:

means for automatically sensing the completion of stitching, by the semi-automatic sewing machine, of a first garment, by sensing a trailing portion of the first garment;

means for automatically engaging the first garment in response to said sensing and moving the first garment away from the stitching needle more quickly than the sewing machine stitches the thread chain, to pull excess thread chain extending past the trailing portion of the first garment relatively taut;

means for automatically severing the excess thread chain from the trailing portion of the first garment when the excess thread chain is relatively taut; and

means for automatically positioning the excess thread chain with respect to a second garment so that the excess thread chain is stitched to the second garment by the sewing machine.

2. An attachment as recited in claim **1** wherein said automatic positioning means comprises: blowing means for blowing said stitch chain from the position at which it is severed to a position on the opposite side of the stitching needle; and catching means for catching the thread chain at said position on the opposite side of the stitching needle and gradually releasing the excess thread chain as it is stitched to the second garment.

3. An attachment as recited in claim **2** wherein said catching means maintains tension on said excess thread chain by frictionally engaging said excess thread chain, to gradually release it as it is stitched to the second garment.

4. An attachment as defined in claim **2**, wherein said blowing means comprises first and second air jets, said first jet adapted to blow said stitch chain from the position at which it is severed to a position on the opposite side of the stitching needle, and said second jet adapted to direct said stitch chain directly to said catching means.

5. An attachment as recited in claim **3** wherein said catching means comprises a catching finger; a linear actuator operatively connected to said catching finger for moving said catching finger from a catching to a holding position; and a block of material stationary with respect to said catching finger and cooperating with said catching finger so that said catching finger holds the excess thread chain between it and said block of material.

6. An attachment as recited in claim **1** wherein said means for automatically engaging the garment in response to said sensing comprises a wheel rotatable about an axis perpendicular to the direction of movement of the garment; a flat surface cooperating with said wheel; means for rotating said wheel about its axis; a generally circular arcuate circumferential portion of said wheel cooperating with said stationary surface so that when said circular arcuate circumferential portion of said wheel is above said stationary surface with said garment therebetween the wheel propels the garment in the direction of rotation of the wheel; and surface means of said wheel defining non-garment propelling portions of said wheel so that when said surface portions of said wheel are directly above said stationary surface said garment is not propelled even though said wheel may rotate.

7. An attachment as recited in claim **6** wherein said wheel garment-engaging portions are made of an elastic

material, and wherein said arcuate portion thereof has an arcuate circumferential extent of approximately 270°.

8. An attachment as recited in claim **1** wherein said severing means comprises a stationary plate having an edge, said plate disposed between said stitching needle and said automatic engaging means; a rotatable plate having an edge cooperating with the edge of said stationary plate; a shaft operatively connected to said rotatable plate and defining an axis about which the rotatable plate rotates; and a linear actuator operatively connected to said shaft for effecting rotation of said shaft to thereby move said movable plate from a non-severing position to a severing position.

9. An attachment as recited in claim **1** further comprising means for automatically stopping stitching action of said sewing machine, and raising said presser foot, in response to said sensing of the trailing portion of a first garment; and wherein said sensing means comprises electric eye means.

10. An attachment as recited in claim **9** wherein said semi-automatic sewing machine comprises a foot pedal actuator for actuating an arm for engaging a clutch, when the arm is actuated to engage the clutch the sewing machine operating to effect stitching, and when the arm disengages the clutch the sewing machine terminating stitching; and wherein said means for automatically stopping stitching action of said sewing machine comprises a linear actuator operatively connected between said arm and said foot pedal, and a rod having an enlarged actuator thereon operatively connected between said arm and said foot pedal; said linear actuator including a movable portion thereof which has an abutment for engaging said enlarged portion attached to said rod; and means for effecting actuation of said linear actuator to move said abutment, in response to said sensing, away from said enlarged attachment to said rod so that said rod does not engage said abutment, thereby causing the arm to move to a clutch disengaging position.

11. A method of automatically stitching excess thread chain to a cloth so that no free stitches are provided on the leading edge of the cloth, utilizing a semi-automatic sewing machine having a stitching needle for stitching the thread chain, the method comprising the steps of:

(a) automatically sensing the completion of stitching, by the semi-automatic sewing machine, of a first cloth, by sensing a trailing portion of the first cloth;

(b) automatically engaging the first cloth in response to the sensing and moving the first cloth away from the stitching needle more quickly than the sewing machine stitches the thread chain, to pull excess thread chain extending past the trailing portion of the first cloth relatively taut;

(c) automatically severing the excess thread chain from the trailing portion of the first cloth when the excess thread chain is relatively taut; and

(d) automatically positioning the excess thread chain with respect to a second cloth so that the excess thread chain is stitched to the second cloth by the sewing machine, so neither cloth has free stitches extended therefrom.

12. A method as recited in claim **11** wherein step (d) is practiced by blowing the stitch chain from the position at which it is severed to a position on the opposite side of the stitching needle, catching the thread chain at the position on the opposite side of the stitching needle, and gradually releasing the excess thread chain as it is stitched to the second cloth.

13. A method as recited in claim **11** wherein the sewing machine has a presser foot and a foot pedal actuator for actuating an arm for engaging a clutch, when the arm is actuated to engage the clutch the sewing machine operating to effect stitching, and when the arm disengages the clutch the sewing machine terminating stitching; and comprising the further steps of automatically acting on the arm for disengaging the clutch and raising the presser foot in response to step (a), and after step (d) allowing manual reactuation of the foot pedal to move the arm for engaging the clutch.

14. A linkage assembly for a semi-automatic sewing machine which comprises a foot pedal actuator for actuating an arm for engaging a clutch, when the arm is actuated to engage the clutch the sewing machine operating to effect stitching, and when the arm disengages the clutch the sewing machine terminating stitching:

means for automatically stopping stitching action of said sewing machine comprising a linear actuator operatively connected to said arm and said foot pedal, and a rod having an enlarged actuator thereon operatively connected to said arm and said foot pedal;

said linear actuator including a movable portion thereof which has an abutment for engaging said enlarged portion attached to said rod; and

means for effecting actuation of said linear actuator to move said abutment away from said enlarged attachment to said rod so that said rod does not engage said abutment, thereby causing the arm to move to a clutch disengaging position.

15. An assembly as recited in claim **16** further comprising resetting means operatively associated with said linear actuator, for actuation by said enlarged portion for resetting said linear actuator after the arm has moved to a clutch disengaging position; and further comprising cushioning means operatively connected between said linear actuator and said abutment.

16. An assembly as recited in claim **14**, wherein said means for effecting actuation of said linear actuator comprises sensing means for detecting a trailing portion of a first garment.

17. An assembly as recited in claim **16**, wherein said sensing means comprises electric eye means.

18. An attachment for a semi-automatic sewing machine, having a stitching needle for stitching a thread chain, a presser foot, and a power source, comprising:

means for positioning any excess thread chain extending from a trailing edge of an article which has just been stitched by the sewing machine after severing of the excess thread chain from the article, said positioning means comprising:

blowing means for blowing said stitch chain from the position at which it is severed to a position on an upstream, first side of the stitching needle;

catching means for catching the thread chain at said position on the upstream side of the stitching needle and maintaining tension on said excess thread chain by frictionally engaging it, to gradually release it as it is being stitched to another garment; and

said catching means comprising a catching finger; a linear actuator operatively connected to said catching finger for moving said catching finger from a catching to a holding position; and a block of material stationary with respect to said catching finger and cooperating with said catching finger so that said catching finger frictionally holds the excess thread chain between it and said block of material.

19. An attachment as recited in claim **18** wherein said block material is a block of rubber.

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